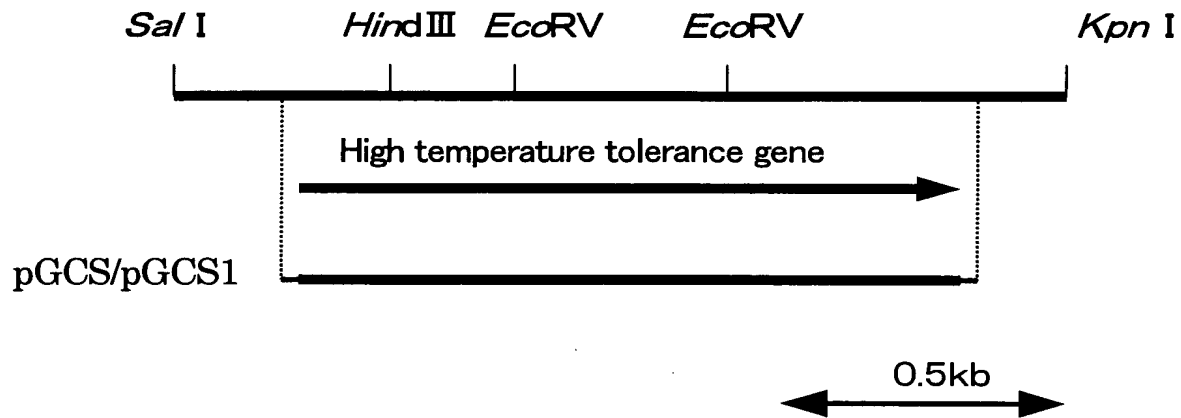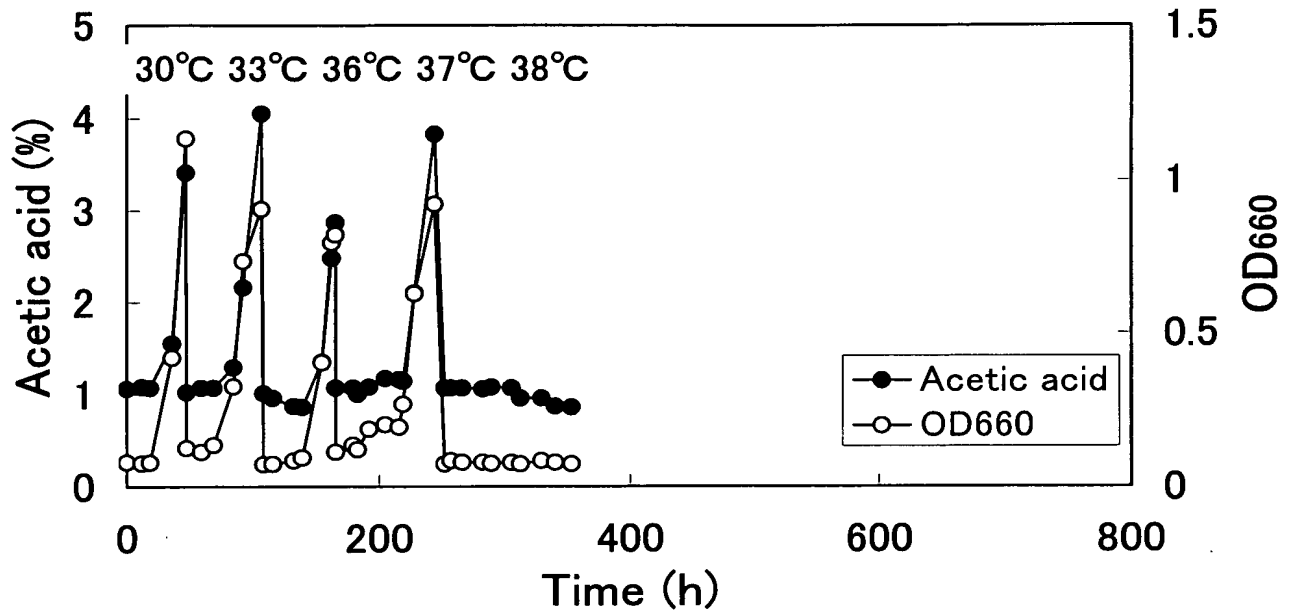10/538481

Fig. 1

Fig. 2

FERMENTATION PROCESS OF ORIGINAL STRAIN

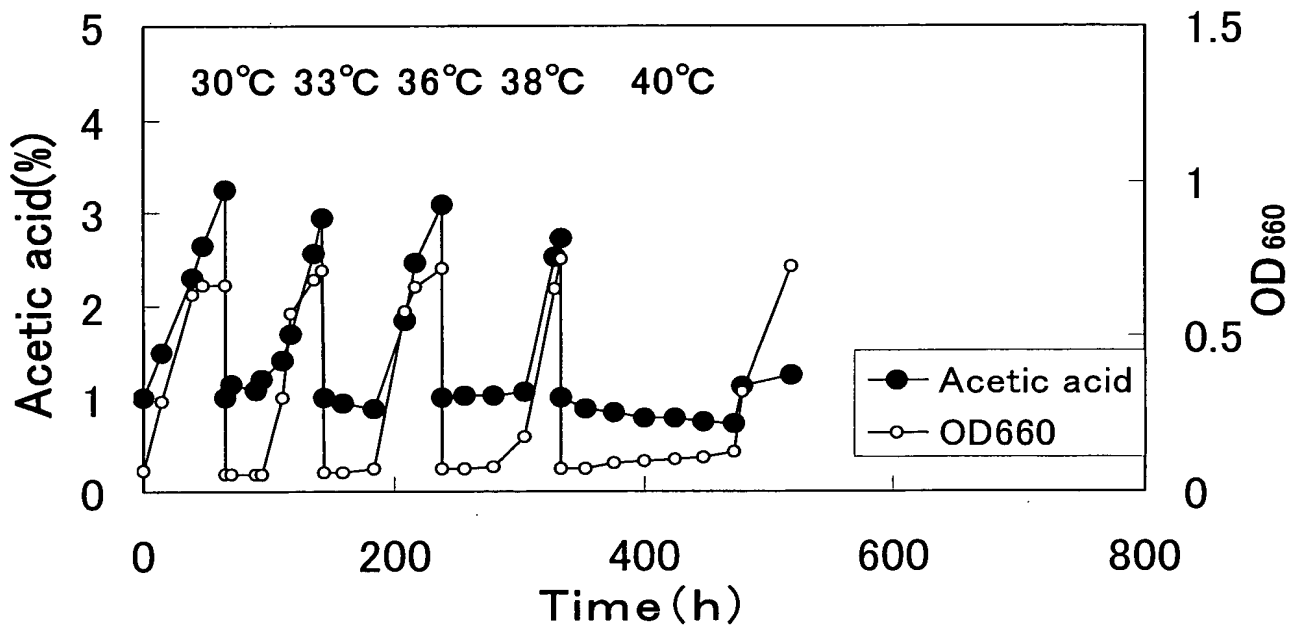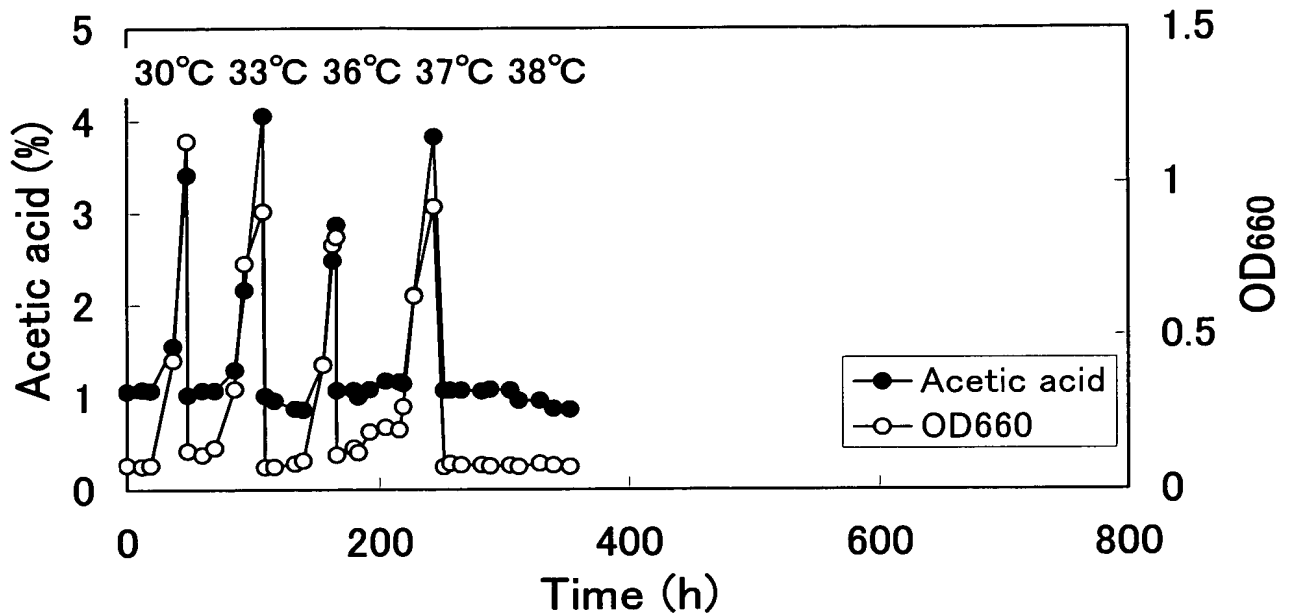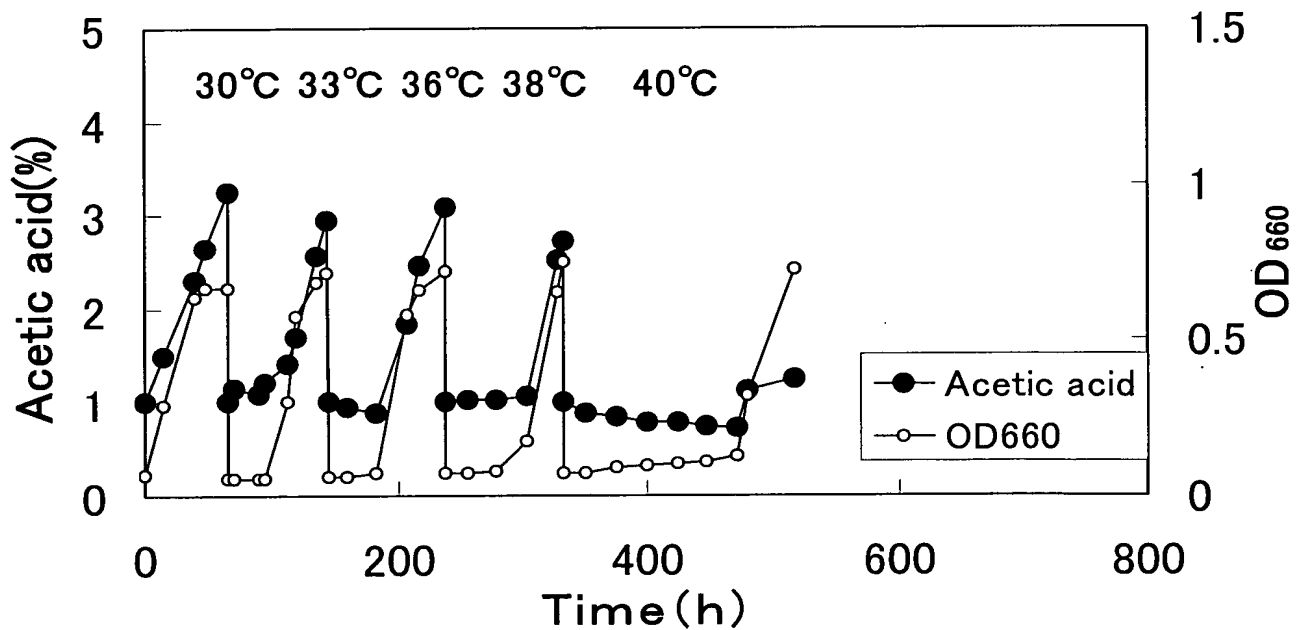## FERMENTATION PROCESS OF TRANSFORMANT

Fig. 3

FERMENTATION PROCESS OF ORIGINAL STRAIN

FERMENTATION PROCESS OF TRANSFORMANT

Fig. 4

```
MetSerValPheAsnAlaLeuValSerPro AlaGlyLeuAlaAlaThrValAlaValAla  20
GlyCysMetGlnAlaAlaLeuGlyThrPhe LeuValSerArgPheArgTrpGlnGluLys  40
ArgMetAspArgAlaValProMetProPro ValSerValLeuLysProLeuHisGlyAsp  60
GluProLeuLeuGluGluAlaLeuGluSer PheCysThrGlnAspTyrProGlnMetGln  80
IleValPheGlyValGlnAlaGluAspAsp AlaAlaIleProIleValGlnArgLeuMet 100
GluArgHisProAspValGlnMetGluLeu ValIleAspProThrPheHisGlyLeuAsn 120
ArgLysIleGlyAsnLeuIleAsnIleMet ThrArgValLysHisAspValLeuValIle 140
SerAspSerAspIleHisValAlaProAsp TyrLeuArgHisValValGlyAlaMetVal 160
ProAspAsnValGlyLeuValThrThrLeu TyrAlaGlyLeuProAlaSerSerThrLeu 180
ProArgLeuLeuAlaAlaCysGlnIleAsn HisAsnPheLeuProGlyValMetLeuSer 200
LeuTyrLeuGlyArgGlnAspCysLeuGly AlaThrMetAlaLeuArgArgSerMetLeu 220
AspGluIleGlyGlyLeuGluAlaLeuVal ProHisValAlaAspAspAlaIleLeuGly 240
ArgTyrValArgAspArgGlyLysAspIle AlaIleAlaAlaCysMetThrTrpThrThr 260
ValGlyGluThrSerMetArgGluValLeu AlaHisGluLeuArgTrpGlyArgThrVal 280
LysThrLeuGluProAlaGlyTyrAlaAla SerAlaIleGlnLeuProLeuPheTrpAla 300
SerValAlaValLeuAlaAlaProHisAla ThrTrpThrTrpSerPhePheLeuGlyAla 320
TrpGlyTrpArgAlaValCysSerPheIle LeuAspArgThrLeuAlaGlnArgSerLeu 340
ValLeuProSerLeuLeuLeuProLeuArg AspTrpIleSerAlaAlaValMetValGly 360
SerValThrGlyThrArgValAlaTrpArg GlyGlnThrMetHisValThrProHisSer 380
ValMetThrProArgSerGlnProAlaSer ProGlyAsp                      393
```
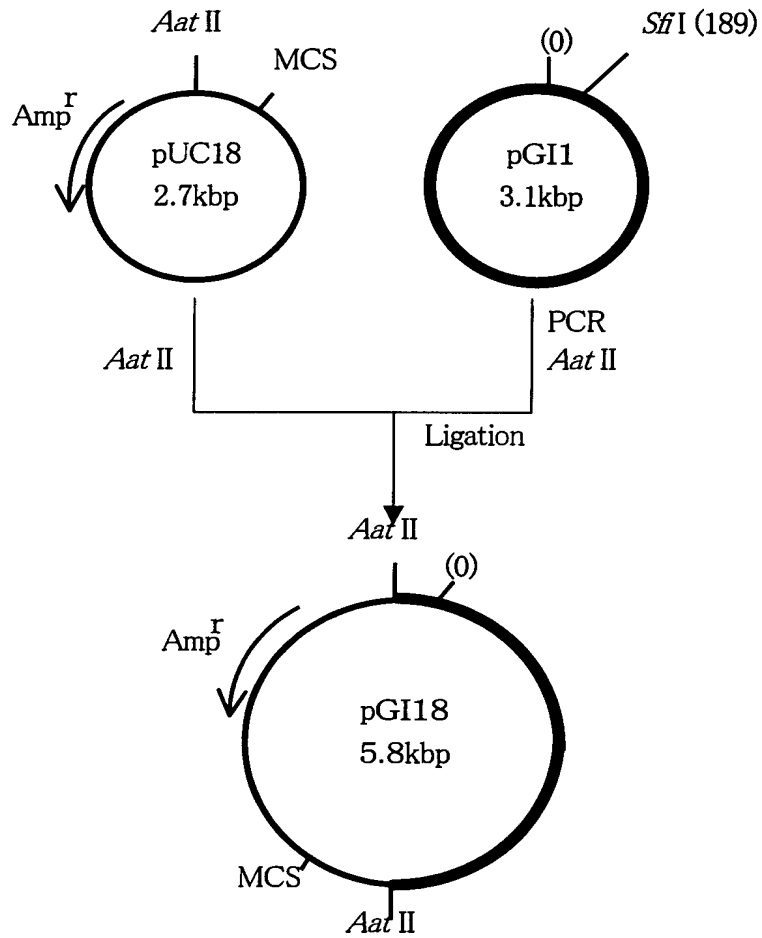
Fig. 5

5'-GAAGAGTGATATTACACTTCCCTGACGCCG-3'

Fig. 6

5'-CCCGTTCTTATTAACGACAGGGTTGG-3'

Fig. 7

```
gaagagtgat attacacttc cctgacgccg ttttctaatt tgctccatac gcgggacctt      60
gccggaaaga taatgtctgt tttcaacgct cttgtttcac ccgccggact ggccgcgacc     120
gttgcggtcg ccgggtgcat gcaggcagcg cttggcactt ttctggtctc gcgtttccgg     180
tggcaggaaa aacgcatgga ccgggcggtg cccatgcctc cggtttccgt gctcaagccc     240
ctccacggcg atgaaccgct gctggaggaa gcgcttgaaa gcttctgcac gcaggattac     300
ccgcagatgc agatcgtctt tggcgtacag gccgaagacg atgcggcgat cccgatcgta     360
caacggttga tggaacgcca cccggatgtg cagatggaac tggtgattga ccccaccttc     420
cacgggctca accgcaagat cggcaacctg atcaacatca tgacgcgcgt gaagcatgat     480
gtcctggtca tttccgattc ggatatccac gttgcccccg attacctgcg gcatgtggtg     540
ggcgccatgg tgcccgacaa tgtcggcctg gtcacgacgc tgtacgcggg gctgcccgcg     600
tcatccacgc tgccgcgcct gctggccgca tgccagatca accataactt cctgcccggc     660
gtgatgctgt cactctacct cgggcggcag gactgccttg gggcgacaat ggcgctgcgg     720
cgttccatgc tggacgaaat cggcgggctg gaagccctcg tgccgcatgt ggccgatgat     780
gcgatactgg gccgttacgt gcgtgaccgt ggcaaggata tcgccattgc cgcgtgcatg     840
acctggacca ccgtgggcga gacctcgatg cgtgaggtgc tggcgcatga actgcgctgg     900
ggccggaccg tcaagacgct ggagcctgcg ggttatgccg catccgccat ccagctgccc     960
ctgttctggg ccagcgtcgc cgtgcttgcc gcgccgcatg cgacctggac atggtccttc    1020
tttcttggtg catggggatg gcgggccgtg tgttccttca tcctggaccg tacgctggcg    1080
caacgtagtc tggtgctgcc gtcactgctt ctgccactgc gcgactggat ctcggccgcc    1140
gtcatggtgg gcagtgtcac tggcacgcgg gttgcatggc gtgggcagac aatgcatgtc    1200
acgccccatt cggtcatgac accacgatcg caaccggctt ccccccggtga ctgacccgcc    1260
gtcagcaggc tgaactgctt gagaattcca accctgtcgt taataagaac ggg           1313
```

Fig. 8

Fig. 9

```
catggggcgt caccccccagc ggccagcttg gctacctgat ggacagggcg ggccttctgc    60
aagccctcgg ccactgccat ctgccgggat atgaggccaa atacgaaccg aaggaaaagc   120
gcaccttctg ctaccccacc cagaacgcca gcggctgggc tgtgcagcca tgatcgccaa   180
cccctccctc ttcctgagca attcggaaga gcgatttccg ccgactgaac acgtcgaaaa   240
tggcagtttt ccaccgaaaa aaggaaagga ccataggaaa ggattaatat cttatttta   300
tctaggggtt tgccgatccg cgattttcgc tgggaaaccg ccaaaaatgg cttgccatta   360
ggtcgcacca catgcgacca taaagtcgca cagtgtgcga cctattcggc ccatatacag   420
aggttcccca catgcggaat gtcacccgtc tcaagacccg caaagaccgg ctccgcgagg   480
accaagccga cctgttgaag caagcccttc tgcccttcgc agaggacgat ggaccgatgc   540
gggatgcggt cggacggctc tacgtccaga tcaagaacct caccaccccca gaccccggaa   600
ccacggagcc gttcgtcatg atccgtcccg cccagaatcg cgccgtcacc ctctggctgc   660
tgaagaacag taagcggccc atgaaggccg tggacgtatg gacgctgctg ttcgaccacc   720
tgtttcccca taccggccag atcatgctga cccgtgagga aatcgcggaa aaagtcggta   780
tccgggtcaa cgaagttaca gccgtcatga cgagctggt gagcttcggc gcgattttct   840
ccgagcgcga gaaggtggcc ggaatgcgcg ggccgggcct cgcccgctac tacatgaacc   900
ggcatgtggc cgaggtcggc agccgcgcca cgcaggaaga acttgcccta atcccacgcc   960
ccggcgccaa gctggcagtc gtgcagggtg gcaaggctta acccatgaag gtttcggaac  1020
tggacgtgtt cgacagcgcc aaggcggcac aagacccgtt ggtgcgggaa gaactgctgc  1080
aagcagcgca ggcggacggc cacggccccg ccctcgctca tgcccgttcc gtcatagcca  1140
aggcgcgggc cgggcaggac gccaaggctt aacggccccg ccctctcccg cctcgatccc  1200
ggcgggcctg tagcatctcc tgatgctcct tggcgttttt ggcccgctgc tcggcccgct  1260
ctttctcggc cgctgcggct cttaggcgct cttcggccag ccgcatccgc tcgtccatct  1320
gacgtttccg atctgcctcg gcatccttgg cggctcctgc cttcagccct ttgctgaaag  1380
ccatccactt attggcggtt ttctcggctt tctgctgtat cggcggggtc agccggtcaa  1440
atgcctgggc caccctctcg aagccctcac gcatggcgtt gacggcctgc gccagtttag  1500
ccagggcgaa atctatcacc tcggcccgct gggcgttctc ggcccggata cgccggttgt  1560
ggttgccggt cggggtctgg tggcccttcc gttccagagc caccacattc ggccccatgt  1620
gccgctctgg aacgcggtct agcccctgct ccgcattgct ccggtgatct atccgggcct  1680
cttgcccagc ccgctctagc gcggcattgg caaggcccgc ccatagctgc cggatttcct  1740
tcacctcgtc ggcggccttc cccagtccca tgccctgccg cttcttgtcg acagttcga  1800
tggttgattt gtctccaaag gacagcttgc catcggcccc ccgctccacc gtgcgggtgg  1860
tggtcatgat gtgcgcgtga tgattccggt cgtcgccctc gtcacccgga agatgcacgg  1920
```

Fig. 10

```
ccacgtccac ggccaccccg taccgctgga ccaactcacg cgcgaaactg tccgccagtt   1980
cggcccgctg ctcgctggtg agttcatgag ggagggccac aacccattcc ctcccggtgc   2040
gggcgtcctt gcgtttctct gatcgctccg cgtcattcca caattccgaa cggtcagcgg   2100
tgccaccccc cggaatgaaa attgccttat gggcaacgct attctgcctg gggctgtatt   2160
tgtgttcgtg cccgtcaacc tcgttggtca aatcctcgcc agcacgatac gcagccgcag   2220
ccacaacgga acgccctgcg ctccggctga tcggtttcgt ttctgcgcga tagattgcca   2280
cggatcgagc gcctaccttt tggagttaaa cgggggggttc aggggggcga agccaccatg   2340
acgcaggact tgcacttgtg caagtcgtaa ctgcgccctt aatacctgac ggcatcaagg   2400
gatatgtggt attcgtttga aacggaacgg ctccacggtg aggatgatat gagcgatatt   2460
gcgaaagaga ttgagaacgc caaaaggatc atagctgaac agaaaaagcg catcaaagat   2520
gcccagaagg aagcagctaa agcggaatca aagttgaggg accgtcagaa ctacatcttg   2580
ggcggcgcac tggtaaaact tgccgaaaca gatgaacggg ccgtccgcac tattgaaaca   2640
cttttgaagc tggtggatcg tccatcagac cggaaggcgt ttgaggtgtt ttcccgtctc   2700
ccatccctct ccctgcccac gcagccagca ccggacaccg gccatgagtg aggcactgga   2760
agaagatccg tttgaactgt tcaaaagggt cgaaaaaagc ctgtccacgg ccaccgccag   2820
catggagcgg ctggccgccg aacaagatgc caggtgcaag accatttcag acgccgccgg   2880
aaaagcctct aaattggccg aggaagccgg tgacaccttc acagcatcca agaggcgtct   2940
gatgatctgg acggccctct cgcgcggctct gctggtctgt ggcgggtggt tggcgggtta   3000
ttggctggga caccgtgacg gttgggcctc tggcacggcc cacgacgtct aagaaaccat   3060
tattatcatg acattaacct ataaaaatag gcgtatcacg aggccctttc gtctcgcgcg   3120
tttcggtgat gacggtgaaa acctctgaca catgcagctc ccggagacgg tcacagcttg   3180
tctgtaagcg gatgccggga gcagacaagc ccgtcagggc gcgtcagcgg gtgttggcgg   3240
gtgtcggggc tggcttaact atgcggcatc agagcagatt gtactgagag tgcaccatat   3300
gcggtgtgaa ataccgcaca gatgcgtaag gagaaaatac cgcatcaggc gccattcgcc   3360
attcaggctg cgcaactgtt gggaagggcg atcggtgcgg gcctcttcgc tattacgcca   3420
gctggcgaaa gggggatgtg ctgcaaggcg attaagttgg gtaacgccag ggttttccca   3480
gtcacgacgt tgtaaaacga cggccagtgc caagcttgca tgcctgcagg tcgactctag   3540
aggatccccg ggtaccgagc tcgaattcgt aatcatggtc atagctgttt cctgtgtgaa   3600
attgttatcc gctcacaatt ccacacaaca tacgagccgg aagcataaag tgtaaagcct   3660
ggggtgccta atgagtgagc taactcacat taattgcgtt gcgctcactg cccgctttcc   3720
agtcgggaaa cctgtcgtgc cagctgcatt aatgaatcgg ccaacgcgcg gggagaggcg   3780
gtttgcgtat tgggcgctct ccgcttcct cgctcactga ctcgctgcgc tcggtcgttc   3840
ggctgcggcg agcggtatca gctcactcaa aggcggtaat acggttatcc acagaatcag   3900
gggataacgc aggaaagaac atgtgagcaa aaggccagca aaaggccagg aaccgtaaaa   3960
aggccgcgtt gctggcgttt ttccataggc tccgcccccc tgacgagcat cacaaaaatc   4020
gacgctcaag tcagaggtgg cgaaacccga caggactata aagataccag gcgtttcccc   4080
```

Fig. 11

```
ctggaagctc cctcgtgcgc tctcctgttc cgaccctgcc gcttaccgga tacctgtccg   4140
cctttctccc ttcgggaagc gtggcgcttt ctcaatgctc acgctgtagg tatctcagtt   4200
cggtgtaggt cgttcgctcc aagctgggct gtgtgcacga accccccgtt cagcccgacc   4260
gctgcgcctt atccggtaac tatcgtcttg agtccaaccc ggtaagacac gacttatcgc   4320
cactggcagc agccactggt aacaggatta gcagagcgag gtatgtaggc ggtgctacag   4380
agttcttgaa gtggtggcct aactacggct acactagaag gacagtattt ggtatctgcg   4440
ctctgctgaa gccagttacc ttcggaaaaa gagttggtag ctcttgatcc ggcaaacaaa   4500
ccaccgctgg tagcggtggt ttttttgttt gcaagcagca gattacgcgc agaaaaaaag   4560
gatctcaaga agatcctttg atcttttcta cggggtctga cgctcagtgg aacgaaaact   4620
cacgttaagg gattttggtc atgagattat caaaaaggat cttcacctag atccttttaa   4680
attaaaaatg aagttttaaa tcaatctaaa gtatatatga gtaaacttgg tctgacagtt   4740
accaatgctt aatcagtgag gcacctatct cagcgatctg tctatttcgt tcatccatag   4800
ttgcctgact ccccgtcgtg tagataacta cgatacggga gggcttacca tctggcccca   4860
gtgctgcaat gataccgcga gacccacgct caccggctcc agatttatca gcaataaacc   4920
agccagccgg aagggccgag cgcagaagtg gtcctgcaac tttatccgcc tccatccagt   4980
ctattaattg ttgccgggaa gctagagtaa gtagttcgcc agttaatagt ttgcgcaacg   5040
ttgttgccat tgctacaggc atcgtggtgt cacgctcgtc gtttggtatg gcttcattca   5100
gctccggttc ccaacgatca aggcgagtta catgatcccc catgttgtgc aaaaaagcgg   5160
ttagctcctt cggtcctccg atcgttgtca gaagtaagtt ggccgcagtg ttatcactca   5220
tggttatggc agcactgcat aattctctta ctgtcatgcc atccgtaaga tgcttttctg   5280
tgactggtga gtactcaacc aagtcattct gagaatagtg tatgcggcga ccgagttgct   5340
cttgcccggc gtcaatacgg gataataccg cgccacatag cagaacttta aaagtgctca   5400
tcattggaaa acgttcttcg gggcgaaaac tctcaaggat cttaccgctg ttgagatcca   5460
ttcgatgtaa cccactcgtg cacccaactg atcttcagca tcttttactt tcaccagcgt   5520
ttctgggtga gcaaaaacag gaaggcaaaa tgccgcaaaa aagggaataa gggcgacacg   5580
gaaatgttga atactcatac tcttcctttt tcaatattat tgaagcattt atcagggtta   5640
ttgtctcatg agcggataca tatttgaatg tatttagaaa aataaacaaa taggggttcc   5700
gcgcacattt ccccgaaaag tgccacctga cgtc                                5734
```

Fig. 12

cgctgacgtc gtgggccgtg ccagaggccc

Fig. 13

ggccaagacg tctgcagcat ggggcgtcac